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ABSTRACT

Reported are results of a study of a sample of 259 students at the University of Massachusetts who scored low on a math placement test and later took precalculus math classes. Several possible conclusions are presented to explain the test results. A significantly higher percentage ($p<.05$) of a remedial sample (compared to a non-remedial sample) successfully completed two precalculus math classes. Data indicate, however, that many of the students who took the remedial experience may not have needed it and may have been misclassified by the math placement test as low-math students. (RH)

Non-Remedial Low-Math Students' Performance in Precalculus: Preliminary Data[1,2]

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The Summer Math Placement Test identifies entering freshmen who are not prepared for precalculus. These students are generally advised to take a remedial math course before taking a precalculus course. However, many go directly into precalculus (about 30% of the Summer 1983 low-math group). How do these low-math students perform in precalculus? How does their performance compare to that of low-math students who take a remedial math course and then take precalculus?

These questions are of interest mainly because they bear on the more general problem of evaluating the remedial math program. Comparison of remedial and non-remedial low-math students' performance in precalculus

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[1]This report supplements two previous reports (Follow-Up of Remedial Math Students: Preliminary Data (May 1985) and Math Placement Test Scores Before and After a Remedial Math Course: Pilot Data (July 1985)). Together, the three reports indicate the direction and progress of an ongoing attempt to evaluate the remedial math program at the University of Massachusetts, Amherst.

[2]For convenience of exposition, students with a Summer Math Placement Test score at the remedial level (see A Guide to the Use of Math Placement Test Scores; also Mathematical Deficiencies of Entering Students at U Mass, Amherst (p. 2)) are referred to as low-math students. Those who complete a remedial math course are referred to as remedial low-math students, and those who do not are referred to as non-remedial low-math students.

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constitutes a direct test of the effectiveness of the remediation attempt. Those who complete a remedial math course should do better in precalculus than those who do not.

The performance of non-remedial low-math students in precalculus is of further interest, however, since it provides information on the validity of the Summer Math Placement Test as a diagnostic tool. If low-math students are in fact not prepared for precalculus, the performance of non-remedial low-math students should directly reflect this fact.

Follow-up of the math course activities of remedial and non-remedial low-math students identified in Summer 1983 and Summer 1984 is currently being conducted. The purpose of this report is to present preliminary data on the non-remedial group.

Initial Sample

An initial sample consists of 259 students who were identified as low-math in Summer 1983, and who completed precalculus as a first math course in Fall 1983, Spring 1984, or Fall 1984. As shown in Table 1, 31% of the students in the Summer 1983 low-math group (42% of the 615 non-remedial low-math students) completed precalculus as a first math course sometime during their first three semesters at the university.

Table 2 shows the particular precalculus courses completed. Seventy-one percent of the students in the sample completed Math 106 or 107 (the first or second part of two-semester precalculus), and 29% completed Math 104 or 104A (one-semester precalculus).

Performance in Precalculus

How do non-remedial low-math students perform in precalculus? As shown in Table 3, 79% of the students in the sample who completed Math 106 or 107 successfully completed the course (i.e., received a C or higher). Eighty percent of those who completed Math 104 or 104A did so successfully.

Comparison With a Sample of Remedial Low-Math Students

As shown in Table 1, 212 students in the Summer 1983 low-math group completed a remedial math course in Fall 1983, Spring 1984, or Fall 1984. Partial follow-up data are available for 158 students who completed the course in Fall 1983, and indicate that 68 students (43%) completed precalculus as a second math course in Spring 1984 or Fall 1984. Table 4 shows the precalculus performance of this sample of remedial low-math students.

As comparison of Tables 3 and 4 indicates, percent successful completion of Math 106 or 107 was lower for the non-remedial sample than for the remedial sample ($x^2(1) = 3.63$, $p < .05$). However, percent successful completion of Math 104 or 104A was statistically the same for the two groups ($x^2(1) = 3.53$). These comparisons must be interpreted with caution, since the number of students in the remedial sample is small.

Comparison With the Precalculus Population

Table 5 show grade distribution summaries for the Fall 1983 through Fall 1984 precalculus population. As comparison of Tables 3 and 5 indicates, percent successful completion of Math 106 or 107 was lower for the non-remedial sample than for the Math 106-107 subpopulation ($x^2(1) = 5.30$, $p < .025$). Percent successful completion of Math 104 or 104A was about the same for the non-remedial sample and the Math 104-104A subpopulation ($x^2(1) = .74$).

Alternative Interpretations[3]

The preliminary results suggest that low-math students who take Math 106 or 107 (about 28% of the Summer 1983 low-math group) benefit from a prior remedial math course. However, many of these students may not actually need

[3]Low-math students who take precalculus are not random subsets of remedial and non-remedial low-math students. Therefore, interpretations cannot be generalized to the total low-math group.

such a course. Indeed, 79% of those who took Math 106 or 107 as a first math course successfully completed the course. Although this percentage is lower than that for the Math 106-107 population, it is nonetheless quite high.

The results also suggest that low-math students who take Math 104 or 104A (about 15% of the Summer 1983 low-math group) neither need nor benefit from a prior remedial math course. Eighty percent of those who took Math 104 or 104A as a first math course successfully completed the course. This percentage does not differ statistically from that for low-math students who completed a prior remedial math course, or from that for the Math 104-104A population.

It is important to note that the above interpretations assume that low-math students who take precalculus as a first math course are comparable to those who take precalculus as a second math course, except for the latter group's completion of a remedial math course. If the two groups are comparable, however, then at least 34% of the students identified as low-math by the Summer Math Placement Test are in fact misclassified.

An alternative and, perhaps, more likely assumption is that low-math students who take precalculus as a first math course constitute a special group--they have good reason to believe that their Summer Math Placement Test score does not reflect their true placement level and, therefore, act accordingly. If so, this group should not be used to validate the Summer Math Placement Test, or evaluate the remedial math program.

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Table 1

No. of 1983 Low-Math Students	First Math Course Completed[a]		
	Remedial[b]	Precalculus[c]	None
827	26% (212)	31% (259)	43% (356)[d]

[a]Only includes courses completed in Fall 1983, Spring 1984, or Fall 1984.

[b]Math 010L or 011L.

[c]Math 106, 107, 104, or 104A.

[d]Includes 4 students who withdrew from a precalculus course, and 4 who received incompletes; 1 student who withdrew from a remedial course, and 3 who received incompletes; and any students who completed calculus as a first math course.

Table 2

No. of Students	Precalculus Course Completed			
	Math 106	Math 107	Math 104	Math 104A
259	64% (166)[a]	7% (19)[b]	15% (40)	14% (35)[c]

[a]2 additional students withdrew; 1 received an incomplete.

[b]2 additional students withdrew; 2 received completes.

[c]1 additional student received an incomplete.

Table 3

Non-Remedial Low Math Students

Precalculus Course	No. of Students	Performance in Precalculus		
		Failed	C or Higher	B or Higher
Math 106 or 107	185	10%	79%	39%
Math 104 or 104A	75	8%	80%	39%

Table 4

Remedial Low-Math Students

Precalculus Course[a]	No. of Students	Performance in Precalculus		
		Failed	C or Higher	B or Higher
Math 106 or 107	35	3%	94%	57%
Math 104 or 104A	33	9%	61%	21%

[a]Only includes courses completed in Spring 1984 or Fall 1984.

Table 5

Precalculus Population

Precalculus Course	No. of Students	Performance in Precalculus		
		Failed	C or Higher	B or Higher
Math 106-107	1775	6%	86%	52%
Math 104-104A	1971	5%	84%	51%